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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the container which used a resin sheet and it. It is related with the container using a resin sheet and it excellent in gas barrier property, transparency, heat resistance, a mechanical strength, surface gloss, and surface smoothness in more detail.

[0002]

[Description of the Prior Art]As a resin sheet which has gas barrier property, the sheet which coats or laminates gas barrier property resin to a base film is known, for example. However, in such a sheet, in order to laminate a base film and gas barrier property resin, a glue line is needed. Since it becomes opaque [ the sheet which laminated gas barrier property resin ], a use is limited.

[0003]It is known as resin which has the gas barrier property which was excellent also in vinylidene chloride system polymers, such as a polyvinylidene chloride and a vinylidene chloride copolymer. However, since a vinylidene chloride system polymer generates harmful gas, such as dioxin, and a strong carcinogenic organochlorine compound by combustion, there is in the direction by which use is regulated.

[0004]Polyvinyl alcohol system polymers, such as polyvinyl alcohol and an ethylene-vinylalcohol copolymer, are also known as resin which has oxygen gas barrier property. However, not only moisture vapor transmission is high, but a polyvinyl alcohol system polymer changes oxygen permeability sharply with humidity.

[0005]The container made from polyester which changes from the constituent which made thermoplastic polyester resin contain specific thermoplastic polyamide to JP,63-35647,A is indicated. In this container made from polyester, in order to reduce acetaldehyde concentration, specific thermoplastic polyamide is blended. However, the content of

thermoplastic polyamide is 10 or less % of the weight, and cannot improve gas barrier property. If the content of thermoplastic polyamide exceeds 15 % of the weight, the grade of a fall of acetaldehyde concentration is seldom improved by said gazette, but it is indicated in it that transparency, a mechanical property, etc. of a container moreover fall.

[0006]

[Problem(s) to be Solved by the Invention]Therefore, the purpose of this invention is to provide the container using the resin sheet and it which are excellent in gas barrier property.

[0007]Other purposes of this invention are to provide the container using the resin sheet and it which are excellent in transparency.

[0008]The purpose of further others of this invention is to provide the container using the resin sheet and it which are excellent in heat resistance and a mechanical strength.

[0009]Another purpose of this invention is to provide the container using the resin sheet and it which are excellent in surface smoothness and surface gloss.

[0010]

[Means for Solving the Problem]By constituting from a disperse phase which distributed wholeheartedly to a matrix formed with thermoplastics, and this matrix as a result of examination in order that this invention persons might attain said technical problem, and was formed by gas barrier property resin, It found out that a container using a resin sheet and it excellent in gas barrier property, transparency, etc. was obtained, and this invention was completed.

[0011]That is, a sheet of this invention is a sheet which comprises a disperse phase which distributed to a matrix formed with thermoplastics (A), and this matrix, and was formed by gas barrier property resin (B), and said disperse phase is distributing it in layers. In [ in a projection image of a thickness direction of a sheet, as for a sheet of this invention, two or more stratified disperse phases may lap in a thickness direction of a sheet and ] a section of a thickness direction of a sheet, 50-5000 disperse phases per  $1\text{-mm}^2$  1-50 micrometers in width and 50-1000 micrometers in length may exist. Said gas barrier property resin (B) may be resin which has the oxygen transmission quantity below  $20\text{ ml/m}^2$  and day in 25 micrometers in thickness. It is about  $(A)/(B) = 30 / 70$  to  $70/30$  comparatively (weight ratio) as said resin (A) and said resin (B). Said resin (A) may be polyester system resin, especially polyalkylene ARI rate resin, and said resin (B) may be aromatic polyamide system resin, especially aromatic polyamide system resin obtained from aromatic diamine and aliphatic series  $C_{6-10}$  dicarboxylic acid.

[0012]A lamination layer sheet in which a resin layer which has an adhesive property in this invention to a resin layer or a sheet of thermoplastics (A) and a same system which forms a matrix in at least one field of said sheet is laminated, Thermoplastics (A) which forms a matrix especially in both sides of a sheet, and a lamination layer sheet in which a resin layer of a

same system is laminated are also contained. Thickness of a sheet is about 100-1000 micrometers, thickness rates of a sheet and a resin layer are about former/latter =20 / 80 to 80/20, and peel strength of a sheet and a resin layer of said lamination layer sheet is about not less than 100g/15 mm.

[0013]A container formed with said sheet is also contained in this invention.

[0014]

[Embodiment of the Invention]The resin sheet of this invention comprises a disperse phase which distributed to the matrix formed with thermoplastics (A), and this matrix, and was formed by gas barrier property resin (B).

[0015][Thermoplastics (A)] Although thermoplastics (A) in particular is not restricted but various thermoplastics can be used for it, polyester system resin can use it preferably especially.

[0016]Polyester system resin should just be polymers which have an ester bond in a main chain, for example, the polymer obtained by dicarboxylic acid or the polycondensation of the derivative and diol, the polycondensation of hydroxycarboxylic acid, or the ring opening polymerization of cyclic ester is mentioned.

[0017]concrete -- alkylene terephthalate (for example, 1 and 4-cyclohexane dimethylene terephthalate.) Ethylene terephthalate, butylene terephthalate, etc. and alkylene naphthalate. Gay polyester or copolyester which makes (for example, ethylene naphthalate, butylene naphthalate, etc.) the main repeating units. for example, aromatic dicarboxylic acid, such as phthalic acid and isophthalic acid, and adipic acid. Aliphatic series  $C_{6-12}$  dicarboxylic acid, such as pimelic acid, suberic acid, azelaic acid, and sebacic acid,  $C_{2-6}$  alkylene glycol, such as ethylene glycol and propylene glycol, Copolyester, aromatic polyester (for example, with aromaticdiol, such as bisphenol A.) which use polyoxy alkylene glycol etc. as a copolymerization ingredient the polyarylate etc. which are generated according to esterification with aromatic dicarboxylic acid, such as terephthalic acid and isophthalic acid, etc. -- etc. -- it can illustrate. the copolymerization ingredient in copolyester -- usually -- 1-30-mol % -- it is about 3-20 mol % preferably. Liquid crystallinity polyester and an elastomer are also contained in polyester system resin.

[0018]Polyalkylene arylate resin and the copolyester which makes poly  $C_{2-4}$  alkylene arylate (polyethylene terephthalate etc.) or  $C_{2-4}$  alkylene arylate a main repeating unit especially are contained in desirable polyester system resin.

[0019]the number average molecular weight of polyester system resin -- 10,000-400,000 -- it can choose from about 15,000 to 300,000 range preferably.

[0020]The thermoplastics which forms a matrix is independent, or it can be used, combining it two or more sorts.

[0021][Gas barrier property resin (B)] In 25 micrometers in thickness, as for gas barrier

property resin (B), below  $20 \text{ ml/m}^2$  and day should just be resin which has the oxygen transmission quantity about below  $10 \text{ ml/m}^2$  and day preferably. Especially as gas barrier property resin (B), although not restricted, aromatic polyamide system resin, an ethylene-vinylalcohol copolymer, etc. are used preferably, for example.

[0022]Aromatic polyamide system resin should just have a skeleton of aromatic compounds in polyamide, For example, the polyamide in which it is derived from a diamine component and a dicarboxylic acid component, and at least one ingredients are aromatic compounds among a diamine component and a dicarboxylic acid component, The polyamide etc. which are obtained using aromatic aminocarboxylic acid (for example, aminobenzoic acid, aminonaphthalene carboxylic acid, etc.) are mentioned.

[0023]A diamine component as the polyamide or the copoly amide which is aromatic compounds, For example, the polyamide obtained from aromatic diamine and aliphatic series  $\text{C}_{4-12}$  dicarboxylic acid, Especially Xylylene diamine (especially meta-xylylene diamine, PARAKI silylenediamine), At least one sort of aromatic diamine chosen from the group which consists of a phenylenediamine, diaminotoluene, diaminodiphenylmethane, etc., The polyamide obtained from at least one sort of aliphatic series  $\text{C}_{6-12}$  dicarboxylic acid chosen from the group which consists of adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, etc. is mentioned. The polyamide specifically obtained from adipic acid and meta-xylylene diamine (MXD6), The polyamide obtained from suberic acid and meta-xylylene diamine, the polyamide obtained from adipic acid and PARAKI silylenediamine (PMD6), The polyamide obtained from suberic acid and PARAKI silylenediamine, the polyamide obtained from adipic acid and a 1,3-phenylenediamine, The polyamide obtained from adipic acid and 4,4'-diaminodiphenylmethane, The copoly amide obtained from adipic acid, meta-xylylene diamine, and PARAKI silylenediamine, The copoly amide obtained from adipic acid, meta-xylylene diamine, and N,N'-dimethyl meta-xylylene diamine, the polyamide obtained from 4,4'-diamino biphenylene and adipic acid, etc. are mentioned.

[0024]Polyamide or copoly amide whose dicarboxylic acid components are aromatic compounds, For example, the polyamide obtained from  $\text{C}_{2-10}$  dialkyl amine and aromatic dicarboxylic acid, Especially Ethylenediamine, propylenediamine, trimethylene diamine, At least one sort of  $\text{C}_{2-10}$  dialkyl amines chosen from the group which consists of a tetramethylenediamine, pentamethylene diamine, hexamethylenediamine, etc., The polyamide obtained from at least one sort of aromatic dicarboxylic acid chosen from the group which consists of phthalic acid, phthalic anhydride, isophthalic acid, terephthalic acid, naphthalene dicarboxylic acid, etc. is mentioned.

[0025]As other copolymerization ingredients in copoly amide, lactam (for example,  $\text{C}_{3-12}$

lactam, such as propione lactam, a butyrolactam, a valerolactam, and caprolactam etc.) -- usually -- 1-30-mol % -- desirable -- about 3-20 mol % -- it can use.

[0026]the amide unit acquired from aromatic diamine and aliphatic series  $C_{6-10}$  dicarboxylic acid by desirable aromatic polyamide system resin -- 50-100-mol % (especially 75-100-mol %) -- the polyamide (especially MXD6) or the copoly amide which it has is mentioned.

[0027]The melt viscosity (KYAPI log 270 \*\*, D:1 mm of rough nozzles, L:10 mm) in  $100\text{-s}^{-1}$  of aromatic polyamide system resin is about 50-5000 Ps-s.

[0028]The number average molecular weight in particular of aromatic polyamide system resin is not restricted, for example, can be preferably chosen from the range of 500 to 8000 (especially 500-5000) grade still more preferably 500 to  $1 \times 10^4$  300 to  $5 \times 10^4$ .

[0029]The gas barrier property resin (B) which forms a disperse phase is independent, or it can be used, combining it two or more sorts.

[0030]the rate of thermoplastics (A) and gas barrier property resin (B) -- (A)/(B) = 30 / 70 - 70/30 -- it is about 40 / 60 to 60/40 preferably.

[0031][Structure of a resin sheet] The special feature of this invention is the sheet constituted as mentioned above, and said disperse phase is at the point which stratified or is distributed to plate-like (filmy) in said matrix. The decentralized structure of a disperse phase is controllable by the mobility of resin, resin viscosity, etc. comparatively in resin (A) and resin (B).

[0032]When it projects on the thickness direction of a sheet (setting to the projection image of the thickness direction of a sheet) and sees as such a distributed form from the gestalt with which two or more stratified disperse phases have lapped in the thickness direction of a sheet, i.e., a sheet surface, for example, In the thickness direction of a sheet, the gestalt with which two or more stratified disperse phases overlap can be mentioned. When it sees from a sheet surface especially, being covered by the stratified disperse phase is preferred.

[0033]Especially in the resin sheet of this invention, it is preferred in the section of the thickness direction of a sheet that 50-5000 disperse phases [ about 100-3000 ] per  $1\text{-mm}^2$  1-50 micrometers in width and 50-1000 micrometers in length exist preferably.

[0034]Drawing 1 is a schematic diagram of the section which projected the resin sheet of an example of this invention on the sheet thickness direction. If the resin sheet 1 of this invention is explained using drawing 1, the disperse phase 3 is distributed in layers in Matrix 2. The gas barrier property which such a distributed form was formed by stratified gas barrier property resin (B) by being intercepted by the disperse phase 3 in the thickness direction of a sheet at since it was discontinuous although Matrix 2 was continuing as a whole, and was excellent by the disperse phase 3 is demonstrated. On the other hand, when a disperse phase does not distribute in layers but sea island structure is formed for example, of there being little content of the aromatic polyamide which forms a disperse phase etc., oxygen gas etc. pass and it is

inferior to gas barrier property.

[0035]The thickness of a resin sheet is usually preferably used at 500 micrometers - about 1.5 mm 10 micrometers - 2 mm (for example, 100 micrometers - 2 mm).

[0036][Lamination layer sheet] The resin sheet of this invention may be a single layer sheet, and may be a lamination layer sheet with other thermoplastic resin layers. As resin which constitutes a thermoplastic resin layer, olefin system resin. (For example, polyethylene, polypropylene, etc.), and polyester system resin. (For example, gay polyester or copolyester, such as polyethylene terephthalate and polybutylene terephthalate) etc., They may be polyamide system resin (for example, nylon 6, Nylon 66, Nylon 610, Nylon 612, etc.), polycarbonate system resin, etc. (for example, bisphenol A type polycarbonate etc.).

[0037]The resin layer which has an adhesive property as a lamination layer sheet to the resin layer or sheet of thermoplastics (A) and a same system which forms a matrix in at least one field of said resin sheet. The lamination layer sheet in which (for example, polyester system resin and polyamide system resin) are laminated, and the thermoplastics (A) which forms a matrix in both sides of said resin sheet especially and the lamination layer sheet in which the resin layer of the same system is laminated can be illustrated.

[0038]In this invention, since matrix resin of said resin sheet is thermoplastics (A), the adhesive property of this and the resin layer of a same system is good, and does not need adhesives. For example, not less than 100g/15 mm of peel strength [ not less than 200g/15 mm of ] of a sheet and a resin layer is about not less than 300g/15 mm still more preferably preferably. Surface glossiness and surface smoothness improve by providing a resin layer. Heat resistance and a mechanical strength can also improve by providing a resin layer.

[0039]in a lamination layer sheet, the thickness of a resin sheet is 500 micrometers - about 1.5 mm preferably 10 micrometers - 2 mm (for example, 100 micrometers - 2 mm) -- the thickness rate of a sheet and a resin layer -- former/latter =20 / 80 - 80/20 -- it is about 30 / 70 to 70/30 preferably.

[0040][Manufacturing method] A resin sheet can be manufactured by fabricating to a sheet shaped by the conventional method, after mixing resin (A) and resin (B). It may extend (uniaxial stretching, biaxial stretching, etc.) and the resin sheet may not extend them. For example, the extending method by extrusion methods, such as the extrusion methods (a T-die method, a tubular film process, etc.), the tenter method, the tube method, an inflation method, etc., etc. are mentioned.

[0041]A lamination layer sheet can be prepared by methods, such as the co-extruding method, a heat lamination, and a dry lamination, and does not necessarily need adhesives.

[0042]The resin sheet may contain a conventional additive agent, for example, lubricant, stabilizer (an anti-oxidant, an ultraviolet ray absorbent, a thermostabilizer, light stabilizer-proof, etc.), dyes and pigments, a spray for preventing static electricity, fire retardant, anti blocking

agents, a bulking agent, etc.

[0043][Container] As a method of fabricating a container from the sheet of this invention, the usual thermoforming methods, such as vacuum forming, vacuum pressure sky shaping, and hot-platen shaping, are mentioned, for example. In this specification, it uses for the meaning which may contain not only the package body that has a crevice for accommodating a received body but the lid with a "container." As long as it can open and close to a lid and a package body, it may be dismountable and may combine with the hinge method.

[0044]Since the container of this invention is excellent in gas barrier property, transparency, heat resistance, a mechanical strength, surface gloss, and surface smoothness, Can use it for a various application and For example, containers for fluid restoration, such as a drink, A food-grade container, the container for medicine, oven and the container for microwave ovens, the container of the type filled with boiling water. the foodstuffs (for example, foodstuffs, such as a fishery product in which oil and fat content besides fats-and-oils content foodstuffs, such as a Chinese meat dumpling, exudes etc.) containing (for example, the container for instant food), etc. and oil and fat content -- business -- it can be used for a container, the container with which heat sterilization is presented, a non-heating container, etc.

[0045]

[Effect of the Invention]In this invention, the container using the resin sheet and it which are excellent in gas barrier property can be manufactured. The container using the resin sheet and it which are excellent in transparency can be manufactured. The container using the resin sheet and it which are excellent in heat resistance and a mechanical strength can be manufactured. The container using a resin sheet and it excellent in surface gloss and surface smoothness can be manufactured.

[0046]

[Example]This invention is not limited by these examples although this invention is explained more below at details based on an example. The contents of the ingredient of the resin composition used in the following examples and the measuring method of evaluation criteria are as follows. As long as there is no notice especially, a "part" or "%" is a weight reference.

[0047](Ingredient of a resin composition)

A-1: Polyethylene terephthalate (TR-A, Teijin, Ltd. make)

B-1: Nylon MXD 6 (\*\*6007, Mitsubishi Gas Chemical Co., Inc. make)

B-2: Nylon MXD 6 (\*\*6001, Mitsubishi Gas Chemical Co., Inc. make)

[0048](Measuring method of oxygen transmission quantity) Measurement of oxygen transmission quantity was converted into a thickness in 25 micrometers using the measured value in 25 \*\* and 60%RH according to ASTM D 1434-66.

[0049](Peel strength of a sheet and a resin layer) The sheet was cut to 15-mm width in MD directions, the peel strength at 180 \*\* was measured at speed for /of 200 mm using the tension

tester (tensilon UCT-5T, product made from Cage Ene Tech), and the following valuation methods estimated.

[0050]

O : more than more than 300g/15mmO:100g/15mm, less than [ less than / 300g/15mm / x:100g/15mm ] [0051]After having supplied the extrusion machine, having carried out melt kneading of the resin pellet within the extrusion machine, after fully drying each resin pellet shown in the Examples 1-2 and comparative example 1 table 1, and extruding to a sheet shaped by T pressure die casting, it quenched and the 450-micrometer-thick resin sheet was obtained. The electron microscope photograph (1000 times) of the sheet thickness direction cross section in a vertical direction is shown in drawing 2 - 5 to the flow direction and flow direction of a resin sheet of Example 1 and the comparative example 1. The evaluation result of this resin sheet is shown in Table 1.

[0052]After fully drying each resin pellet shown in the Examples 3-5 and comparative example 2 table 1, To the 1st extrusion machine of a multilayer extrusion machine (two-sort three-layer extrusion machine), supply thermoplastics (A), supply thermoplastics (A) and gas barrier property resin (B) to the 2nd extrusion machine, and within a feed block, After having made the resin layer of resin (A) join both sides of the mixed resin layer of resin (A) and resin (B), laminating and extruding to a sheet shaped by T pressure die casting, it quenched and the lamination layer sheet with a total thickness of 450 micrometers (150 micrometers in thickness of a resin sheet and 150 micrometers each in thickness of a resin layer) was obtained. The evaluation result of this lamination layer sheet is shown in Table 1.

[0053]

[Table 1]

表 1

	実施例 1	実施例 2	実施例 3	実施例 4	実施例 5	比較例 1	比較例 2
樹脂シート	C-1	50 部	40 部	50 部	40 部	40 部	70 部
	D-1	50 部	—	50 部	60 部	—	20 部
	D-2	—	—	—	—	30 部	80 部
					60 部	—	—
樹脂層 (両面積層)	C-1	—	—	100 部	100 部	—	100 部
シートの厚み (μm)		450	450	450	450	450	450
酸素透過量 (ml/㎡・day)	8	4	20	18	18	80	12
剥離強度 (g/15mm)	—	—	1000 以上	200	230	—	50
樹脂シートの分散相の構造	層状	層状	層状	層状	層状	海島	海島

[0054]The resin sheet of an example has less oxygen transmission quantity than the result of Table 1, and since it does not distribute in layers but the disperse phase has sea island structure to gas barrier property being excellent, the resin sheet of the comparative example 1 is inferior to gas barrier property. Peel strength is small, although the lamination layer sheet of an example is excellent in gas barrier property and gas barrier property is improved to the thing with large peel strength as for the lamination layer sheet of the comparative example 2.



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